The makers of special disinfectants, *e.g.*, Germol, Sanitas, Izal, etc., produce them by mixing their products with ordinary soaps in the manner described above.

Sulphur Soap.—A soap containing sulphur is largely used for washing dogs, and also for treating various forms of skin disease. These soaps are very simply made; a good white soap made from tallow and coconut oil is employed, and into it while melted, after it has been fitted, are stirred flowers of sulphur, 10 to 20 lb. to 1 cwt. of soap, a little perfume being added to improve the odour of the soap.

Tar Soap.—A black-coloured tar soap is made and used in fairly large quantities. Either coal-tar, or still better, wood-tar, may be used for it. The latter has rather more medicinal value, and is free from some of the objectionable features of coal-tar. An ordinary soap stock is taken—if slightly alkaline there is no objection—and the tar, in the proportion of about 10 per cent, sometimes a smaller quantity, is crutched in. Wood creosote is also used in making similar soaps, the amount usually added being 5 per cent.

Mercurial Soap.—This is sometimes prepared for treating dogs and other animals, and for preserving skins in taxidermy. It contains corrosive sublimate. One drachm of the latter compound is dissolved in a mortar with 1 oz. of rectified spirit, and 4 oz. of a good soap, cut up into fine shavings, are added. The whole is then incorporated by careful grinding.

Arsenical Soap is also frequently used for washing dogs, cats, and other animals, and in preserving skins. A good formula for making this is to mix in a mortar 4 oz. white soap, 1 oz. white arsenic, 1 oz. soda crystals, and ½ oz. camphor, grinding the whole together, adding a little water to facilitate the ease of working until a smooth mass is obtained.

Tooth Soap.—Tooth soaps are made by taking a well-made and neutral tallow soap, and adding to it, while in a molten condition, finely sifted pumice powder, prepared chalk and starch. The following quantities may be taken as a guide: 20 lb. of soap, 1 lb. of pumice powder, 2 lb. of chalk, and ½ lb. of starch.

Sand Soaps.—Of late years a class of soap has come largely into use for the purpose of cleaning and polishing metals. They are manufactured by many makers and sent out under a great variety of fancy names. We may, however, include them all here under the name of sand soap. They consist of a soap made in the ordinary way which has been incorporated with fine sand, finely-powdered pumice stone, kieselguhr and similar bodies; the soap is taken while in a melted state, and it should not be too dry. The mineral ingredients are then ground in, to the extent that the fancy of the soap-maker may direct, after which the soap paste is put into moulds and pressed, to consolidate it and form a firm block of soap.

The following formulæ will serve to show of what materials such soaps may be made:—

1.	Tallow soap	20 lb.
	Fine sand	80 ,,
2.	Palm oil soap	20 ,,
	Fine sand	40 ,,
	Ground pumice	40 ,,
3.	Tallow soap	10 ,,
	Coconut oil soap	15 ,,
	Fine pumice	40 ,,
	Kieselguhr	35 ,,
4.	Tallow soap	15 ,,
	Palm oil soap	10 ,,
	Red oxide	5 ,,
	Ground pumice	50 ,,
	Fuller's earth	25 ,,

Shaving Soaps.—Shaving soaps are required to produce a good and persistent lather which, when placed on the face,

will remain without drying up. At the same time the soap must not have any action on the skin, however tender that may be. To make such a soap a considerable amount of care is required. The best fats that can be used are tallow and coconut oil, and it is advisable to use both soda and potash in their preparation, as better lathering soaps are then obtained. Shaving soaps can be made either by the ordinary boiling process or by the cold process. In some makes of shaving soap a little gum tragacanth has been added to promote permanence of the lathering qualities. Very little of the gum is required, about 2 lb. to 1½ or 2 cwt. of soap, and it may be added at any convenient point in the process of making.

The following formulæ may be followed in making these soaps:—

Cold-process Shaving Soap.

1.	Tallow	100 lb.
	Coconut oil	12½ ,,
	Soda lye at 72° Tw.	50 ,,
	Potash lye at 72° Tw.	6 ,,
2.	Tallow	88 ,,
	Lard	12½ ,,
	Coconut oil	25 ,,
	Soda lye at 71° Tw.	55 ,,
	Potash lye at 60° Tw.	15 ,,
3.	Tallow	100 ,,
	Coconut oil	20 ,,
	Soda lye at 71° Tw.	52 ,,
	Potash lye at 60° Tw.	8 ,,

These soaps may be scented in any way that the maker may approve, and the recipes previously given for scenting toilet soaps may be followed as a guide.

Boiled Shaving Soap.—In making such soap considerable care must be taken to ensure neutrality. If potash be employed along with the soda, as given in the cold process above, then the soap cannot be salted out. Just enough lye should be taken to ensure the soap being made nearly,

if not quite, neutral, the soap well boiled so as to free it from excess of water, and then an excess of alkali is killed by the addition of a little stearic acid or coconut oil. The recipes just given may be followed as to the fats employed.

Emollient Soaps.—These are toilet soaps to which is added such bodies as lanolin, vaseline, spermaceti in about 5 to 10 per cent. of the weight of the soap.

Cold-water Soaps.—These are soaps for which it is claimed that they will yield a copious lather with cold water. They are made chiefly from coconut oil or palmnut oil, and are filled with soda crystals. They contain a large proportion of water, 30 to 40 per cent., and they are very wasteful in use.

Antimonial Soap.—Take 1 oz. antimony orange and dissolve in 3 oz. caustic potash lye, then mix with 12 oz. white tallow soap to a smooth paste.

Tannin Soap.—97 lb. good white soap and 3 lb. tannic acid.

Saliacyl Soap.—98 lb. good white soap and 2 lb. salicylic acid.

Thymol Soap.—97 lb. good white soap and 3 lb. thymol.

Benzoic Soap.—98 lb. good white soap and 2 lb. benzoic acid.

Floating Toilet Soap.—The stock soap is remelted and then strongly stirred with an agitator; by this means the soap becomes charged with air bubbles and therefore more or less spongy in texture; it is now framed, cut into bars, dried, which makes it rather lighter, cut into tablets and stamped.

Skin Soaps.—Soaps mixed with bran, oatmeal, cornflour, have been sold under the name of skin soaps.

Liquid Glycerine Soap.—Melt together 274 lb. pale oleic acid, 66 lb. coconut oil, 228 lb. caustic potash lye, 60° Tw., then add, boil up, and when saponified add 20 lb. glycerine and enough methylated spirit to make the liquid clear.

Fuller's Earth Soap.—70 lb. soap and 30 lb. fuller's earth. The fuller's earth is thoroughly dried before adding to the soap, and the latter should not contain less than 25 to 30 per cent. water.

Borax Soap.—90 lb. good soap and 10 lb. borax.

Superfatted Soaps.—Soaps made by the milling process are often sold as "superfatted"; they have added to them small quantities of lanolin, refined wool fat, lard, etc.

The main advantage of such soaps lies in that they are more agreeable to use by persons with tender skins, a fact due to the absence of free alkali.

Iodine Soap.—98 lb. neutral white soap and 2 lb. iodine. This should be made fresh as required as it does not keep, the iodine gradually acting on and combining with the alkali of the soap, thereby losing its medicinal virtues.

Farrier's Soap.—A soft soap made from fish oil, caustic potash and wood-tar.

SOFT SOAP.

Soft soap is a very important article in the soap trade; in some districts it is very extensively manufactured, while in others it is made in comparatively small quantities. Soft soap is an amber-coloured to reddish-brown material of the consistency of butter. It is much more soluble in water than the ordinary hard soap, and usually rather more alkaline in its nature. Its detergent and scouring properties are, therefore, greater.

The alkali of soft soap is potash, although a little soda is also occasionally used in conjunction therewith: a soft soap cannot be made with soda only, in the same way as hard soaps cannot be made with potash. Soft soaps owe their consistency to the fact of the greater solubility and hygroscopicity of potash soaps.

Soft soaps are much more simply made than hard soaps.

an hour, after which it is drained off, and to enable it to keep for some time a small quantity of caustic potash lye may be added. Irish moss jelly, unfortunately, does not keep any length of time, or otherwise it might find very many more uses than it does at present. One cwt. of the soap is sliced and mixed with the jelly, then 1½ cwt. of silicate of soda is added and the mixture kept near the boil until all are thoroughly incorporated, when the filling is ready for use, and it may be added to the soft soap at the rate of 8 to 10 lb. to the firkin.

From time to time other filling agents are offered, but generally prove unsatisfactory, and sooner or later make themselves manifest, often to the detriment of the soap-maker and injury to his trade. The author's experience shows that in this, as in many other things, there is nothing like supplying a genuine article to enable one to build up and maintain a good trade.

DRY SOAPS, SOAP POWDERS.

Dry soaps, as they are called, have during the last few years become an important branch of the soap industry. They do not vary much in their composition, the greater number of them being composed of ordinary soap and sodium carbonate; some are scented, others are not. Some makes, sold under special names, contain other constituents which are supposed to give some special value to the soap.

The process of manufacture is very simple, and its simplicity has induced many persons to take up the manufacture of dry soaps. Still, even though simple, some care must needs be exercised to turn out a dry soap of good quality. A first-rate dry soap should be in a fine powder, smooth, not gritty to the feel, nor exhibiting any tendency to aggregate together in lumps, nor staining the packing paper in any way. It is considered a *sine qua non* of a good dry soap that it

should lather freely. We may proceed to make a few observations as to the character of the materials which are used in making dry soaps.

The Soap.—This, the special ingredient in this class of goods, should be present in fair proportion. One of the best known makes contains from 18 to 20 per cent. of actual soap, another has as much as 30 per cent., some get down as low as 5 per cent., but such are dry soaps only in name and more or less frauds on the public. A fair quantity to put in is from 15 to 20 per cent. The soap ought to be well made from good materials, as free as possible from free fat and containing but a small proportion of water—15 per cent. is a fair quantity, but more than 20 per cent. should be avoided. The soap ought to be made from fats, which, like tallow, palm oil or coconut oil, give hard soaps, while the addition of a small quantity of such oils as cotton oil, linseed oil, rosin or other oils, or stock soap, which give soft kinds of soap, is not objectionable; too much should not be used, as then the soap becomes so soft that it does not grind easily and it becomes almost impossible to obtain a fine powder. A good soap for this purpose is made from 40 lb. bleached palm oil, 40 lb. tallow, 10 lb. cotton oil, and 10 lb. coconut oil. Another mixture is 40 lb. palm oil, 40 lb. tallow, 10 lb. linseed oil, and 10 lb. coconut oil. This will give a yellower-coloured soap than the last, the finished dry soap will be darker, and this is sometimes objected to by customers. Another mixture is 40 lb. bleached palm oil, 30 lb. coconut oil, 20 lb. tallow, 10 lb. linseed oil. But the variety of mixtures of fat from which the soap is made is great, and it will serve no good purpose to enumerate them in detail.

Sodium Carbonate.—This is used in the form of soda crystals. Occasionally, should the dry soap show signs of becoming pasty during working, a small quantity in the form of 58 per cent. alkali is often added. This appears to combine

with the excess of moisture in the soap, to which the pastiness is usually due, and make it work properly.

Glauber's Salt.—This product, which is crystallised sodium sulphate, is often added to dry soap in place of soda crystals with the object of cheapening the cost of production, and so be able to turn out an article at a lower price than the best grade of dry soaps. Borax is occasionally added to dry soaps, and is a very good material to add; the only objection to it is that it is expensive.

Phosphate of soda has been added to dry soaps, but the writer sees no very material advantage in its addition. It is a neutral salt, without any detergent properties, while it is rather expensive.

Paraffin, in the form of wax or oil, is often added to dry soaps. The quantity added is but small, rarely exceeding 2 per cent. and oftener not more than ½ per cent. of the dry soap. It is generally conceded that paraffin increases the washing properties of soap. Perfumes of various kinds are often added, but the best known makes are not scented at all, and such odour as they possess is due to the fats used in making the soap.

Other bodies are sometimes added for various reasons to dry soaps. Such will be mentioned later on; the above form as it were the basis of all dry soaps.

Every dry-soap maker has his own manner of working. The general principle which underlies the great majority of the processes is to grind the soap and salts together. This may be carried out either by means of the edge runner mill, when the soda crystals or Glauber's salt are first ground, then the soap is thrown in and gradually worked in. With this manner of working there is sometimes a tendency to a pastiness if the soap be too soft. In such an event it may be remedied by throwing in a small quantity of 58 per cent. alkali.

The difficulty is that the edge-runner does not grind fine enough. A better plan is to use an edge-runner to mix the ingredients, and grind in a devil disintegrator. This is admirable for grinding dry soap and works better than any other form of grinding mill, yielding a product of great fineness, which is a very important feature in dry soap, and should always be aimed at.

Another plan of working which is sometimes followed is to melt the soda crystals by heating them in a pan. The water they contain, as water of crystallisation, is sufficient for this purpose, then add the requisite quantity of soap cut up into fine shavings, stir well, and allow to cool, and grind up in the usual way. There is, however, no advantage in this process over the one described above.

Having described the materials used and the method of making, some recipes may be given for making various dry soaps.

Standard Dry Soap.—20 lb. good soap, 70 lb. soda crystals, 10 lb. refined alkali.

Extra Dry Soap.—30 lb. soap, 60 lb. soda crystals, 10 lb. refined alkali.

Cheap Dry Soap.—15 lb. soap, 50 lb. soda crystals, 5 lb. soda ash, 30 lb. Glauber's salt.

Borax Dry Soap.—25 lb. soap, 60 lb. soda crystals, 5 lb. borax, 10 lb. refined alkali. A better quality can be made from 25 lb. soap, 10 lb. refined alkali, 50 lb. soda crystals, 15 lb. borax.

Paraffin Dry Soap.—20 lb. soap, 70 lb. soda crystals, 8 lb. refined alkali, and 2 lb. soft paraffin scale.

Oatmeal Dry Soap.—15 lb. soap, 70 lb. soda crystals, 8 lb refined alkali, and 7 lb. oatmeal.

Perfume may be added to any extent and of any character the soap-maker desires.

Disinfectant Dry Soap.—Dry soap may be the means of

applying disinfectants, which are simply added in the desired quantities to the materials, as given in the above recipes. If the disinfectant is one which is liquid in character, then it is desirable to reduce the proportion of soda crystals, and increase that of the refined alkali to keep the soap in the form of refined powder, or some absorbent, like kieselguhr or French chalk, may be added to the soap. Perhaps the latter method has some advantage over the former plan.

It might perhaps be added that what is called washing crystal is simply soda crystals ground up with a little soap, about 3 per cent. Sometimes a little ultramarine blue is added to the dry soap in order to take away any yellowish tinge it might possess, and so make it appear whiter in colour.

A blue dry soap has been made which is nothing more or less than ordinary dry soap, to which sufficient ultramarine has been added to give it a blue colour.

The following are a few analyses of dry soaps that are now on the market:—

	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.
Water	50·28	47·85	52·65	52·17	59·16
Soap	7·69	19·25	8·50	25·50	3·50
Soda as Na_2CO_3 . . .	42·03	32·90	38·85	22·33	37·34
	100·00	100·00	100·00	100·00	100·00

These are made with sodium carbonate.

The following are some made with Glauber's salt and sodium carbonate:—

	No. 6.	No. 7.	No. 8.
Water	50·34	47·85	53·65
Soap	8·69	15·36	10·78
Soda as Na_2CO_3 . . .	21·36	15·48	12·32
Sodium Sulphate . .	19·61	21·31	23·25
	100·00	100·00	100·00